Complete Listing of the Claims

Claims

Claims **1-7** (canceled)

Claim **8**. (previously presented) A method to determine the angle β of the second chamber (**6**) of the improved refractometer cell (**9**) of Claim **12** when the refractive index n_g of the transparent material of said cell is known, comprising the steps of

A. preparing a fluid whose refractive index n_1 is known;

B. filling both chambers of said refractometer cell with said fluid;

C. illuminating the cell with a fine beam of light whose vacuum wavelength λ_0 is known,

D. measuring the angle of deflection ψ of the transmitted beam

E. calculating β from the relation

$$\sin(\psi)=\frac{n_1\sqrt{2}}{2}\left\{\left[1-\left(\sin^2(\beta)(1-\left(\frac{n_g}{n_1}\right)^2 f^2)-2\sin(\beta)\cos(\beta)\left(\frac{n_g}{n_1}\right)f\left(1-\left(\frac{n_g}{n_1}\right)^2 f^2\right)^{\frac{1}{2}}+\cos^2(\beta)\left(\frac{n_g}{n_1}\right)^2 f^2\right)\right]^{\frac{1}{2}}\right.$$

$$\left.-\left(\frac{n_2}{n_1}\right)\left[\sin(\beta)\left(1-\left(\frac{n_g}{n_1}\right)^2 f^2\right)^{\frac{1}{2}}-\cos(\beta)\left(\frac{n_g}{n_1}\right)f\right]\right\}$$

where

$$f=\sin(2\beta)g-\cos(2\beta)\left(1-g^2\right)^{\frac{1}{2}} \text{ and } g=\left(\frac{n_1}{n_g}\right)\{\cos(\beta)-\sin(\beta)\}\frac{\sqrt{2}}{2}.$$

Claim **9**. (original) The method of Claim **8** for the case when $\beta\approx 45°$ and n_g is known and said angle β is determined from $\beta=\frac{\sin\psi}{2(n_g-n_1)}+\frac{\pi}{4}$ where said measured deflection angle is ψ.

Claim **10**. (canceled)

Claim **11**. (canceled)

Claim **12**. (previously presented) An improved refractometer cell constructed of a transparent material of refractive index n_g and comprising

A. a first exterior surface (**9**) and a second exterior surface (**14**), said first and second exterior surfaces (**9**, **14**) permitting a light beam (**1**) to pass therethrough so as to enter and exit, respectively, the refractometer cell, and

B. a pair of fluid-containing chambers (**4**, **6**) through which said light beam passes, said chambers (**4**, **6**)

1) each forming a cavity which contains at least two plane, non-parallel surfaces (**10**, **11** and **12**, **13**);

2) are separated by a transparent window therebetween;

3) contain fluids of refractive index n_1 and n_2 respectively, and;

4) are characterized in that said chambers comprise entrance and exit beam-passing plane surfaces (**10**, **11**, **12**, **13**), at least one of which has no other internal beam-passing surface parallel thereto.

Claim **13**. (previously presented) The improved refractometer cell of Claim **12** further incorporating mirror means (**15**) adjacent and parallel to said second exterior surface (**14**) causing the beam transmitted therethrough to be reflected back therefrom through said cell and exiting at said first exterior surface (**9**), where its angular deviation relative to the direction of said incident light beam (**1**) may be measured thereat.

Claim **14**. (previously presented) The improved refractometer cell of Claim **12** wherein the sides transverse to the incident beam of each chamber (**4**, **6**) form a triangle.

Claim **15**. (previously presented) The improved refractometer cell of Claim **14** wherein said first chamber (**4**) forms an isosceles right triangle of 45° base angles (α), said second chamber (**6**) forms a triangle with one 45° base angle (α) and a second angle (β) less than 45° yielding a third angle greater than a right angle, and the hypotenuse (**11**) of the isosceles right triangle of said first chamber (**4**) is parallel to the longest side (**12**) of the triangle of said second chamber (**6**).

Claim **16**. (new) A method to measure the refractive index of a fluid, n, using the improved refractometer cell of Claim **12** comprising the steps of

A. filling both chambers of said cell with a fluid of known refractive index;

B. passing a fine beam of light therethrough;

C. measuring the deflection angle ψ' of the emerging beam;

D. filling both chambers of said cell with said fluid whose said refractive index value n is to be measured;

E. measuring the deflection angle ψ of the emerging beam;

F. calculating said refractive index value n from said measured values of ψ' and ψ.

Claim **17**. (new) A method to measure the refractive index difference, Δn, of two fluids of refractive index n_0 and $n_0 + \Delta n$, respectively, using the improved refractometer cell of Claim **12** comprising the steps of

A. filling both chambers of said cell with a reference fluid of refractive index n_0;

B. passing a fine beam of light therethrough;

C. measuring the deflection angle ψ' of the beam emerging therefrom;

D. replacing said reference fluid in one of said chambers of said cell with said second fluid of refractive index $n_0 + \Delta n$;

E. measuring the deflection angle ψ of the emerging beam;

F. calculating said refractive index value difference Δn between said two fluids from said measured values of ψ' and ψ.